WATER RESOURCES RESEARCH GRANT PROPOSAL

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Abstract

The primary objective of this project is to develop a protocol to determine the optimal placement of riparian/buffer strips in a watershed to maximize its efficiency in removal of sediment and nutrients load and improve its impact on water quality. The study is the first step in developing a tool to assist the design and placement of buffer strips in agriculture dominated watersheds. Buffer strips are a commonly recommended Best Management Practices (BMP) that has been widely used in Oklahoma and other states. To date no planning tools have been developed to assist in the effective placement of buffer sites in watershed to achieve optimal sediment and nutrients removal. Current studies have not addressed the effect of buffer placement on its efficiency. In this study two hydrological models, SWAT (Soil and Water Assessment Tools) and REMM (Riparian Ecosystem Management Model), will be used. SWAT is a widely used

watershed model that simulates runoff, sediment and nutrient load from varying land uses in a watershed. But, like other watershed models, SWAT does not accurately consider the effect of buffer strip placement. The REMM model was developed specifically to simulate runoff, sediment and nutrient loads through buffer strips at a field scale. By combining the two models, we can develop procedures to identify optimal buffer strip placement and achieve the maximal efficiency in sediment and nutrient removal.

Spavinaw watershed, located in northeast Oklahoma and northwest Arkansas, will be used as the prototype watershed for this study. The watershed was chosen because it is the major water supply for the cities of Tulsa and Jay, and its water quality is significantly degraded by agricultural production practices, and buffer strips are a recommended practice to improve the water quality. In our previous projects, we have accumulated extensive special, hydrologic, and water quality data on this watershed, a factor which will help us achieve our goal in a period of one year. In implementing the model, SWAT will be run first to calculate background sediment and nutrient loads without buffer strips. This will show the spatial distribution of the sediment and nutrient loads. This information and other spatial GIS data will be used to identify potential buffer strip locations. SWAT output of runoff, sediment and nutrient load will be used as the input to the REMM model. The combination of REMM with SWAT will allow us to evaluate the effectiveness of buffer strips at each location. After identifying potential buffer strip locations, the effectiveness of buffer width on sediment and nutrient loads will be evaluated. Finally, a protocol for optimal buffer strips placement in a watershed will be developed.